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# Spectrum effects of subglottal pressure variation in professional baritone singers

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The audio signal from five professional operatic baritone singers was analysed by means of spectrum analysis. Each subject sang a sustained diminuendo, from loudest to softest phonation, three times on the vowels [a:] and [ɪ:] at fundamental frequencies representing 25%, 50% and 75% of his total pitch range as measured in semitones. During the diminuendi the subjects repeatedly inserted the consonant [p] so that associated subglottal pressures could be estimated from the oral pressure during [p]-occlusions. Pooling the three takes of each condition, ten subglottal pressures ( $P_s$ ), equidistantly spaced between highest and lowest, were selected for analysis along with the corresponding production of [a:] and [ɪ:] vowels. The levels of the first formant and the singer's formant,  $L_1$  and  $L_{SF}$ , were measured as a function of increasing subglottal pressure. Averaged across subjects, an increase in  $P_s$  resulted in (a) an increase in  $L_1$  and (b) a decrease in  $L_1-L_{SF}$ . This implies that a 10 dB increase at or near 600 Hz was, on average, accompanied by an increase of 17 dB of the level near 3 kHz.

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